# How to Write and publish Great Papers in the Biological Sciences


***From title to references***

***From submission to acceptance***

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Entre Pares, León, México
September 2014

Entre Pares
Tercer Seminario
Para publicar y navegar en las redes de la información científica

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# Workshop Outline

- **How to write and publish great papers**
  - Before you begin
  - Select your audience
  - The article structure
  - The review and editorial process

- **What not to do... (author responsibilities)**



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# How To Write and publish Great Papers

*Before you start*

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# Always keep in mind that …

…. your published papers, as a permanent record of your research, are your passport to your community !




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# *Your personal reason* for publishing


**However, editors, reviewers, and the research community don't consider these reasons when assessing your work.**



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# Why publish?

Publishing is one of the necessary steps embedded in the scientific research process. It is also necessary for graduation and career progression.

**What to publish:**

- **New and original results or methods**
- **Reviews or summaries of** particular subject

} Manuscripts that **advance** the **knowledge** and understanding in a certain scientific field

What NOT to **publish**:

- Reports of no scientific interest
- Out of date work
- **Duplications** of previously published work
- Incorrect or unsupported conclusions


**You need a STRONG manuscript to present your contributions to the scientific community**



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# What is a strong manuscript?

- Has a novel, clear, useful, and exciting message
- Presented and constructed in a logical manner
- Reviewers and editors can grasp the scientific significance easily



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# Before writing you must gather key information

1. **Find out what topics are exciting**
   - most downloaded, e.g. http://top25.sciencedirect.com/
   - most cited, e.g. http://scopus.com/
   - most shared, e.g. http://www.altmetric.com/

2. **Find the trends of your subject area**
   - Keep informed of advances in the field through journal alerts
   - PubMed, for example, shows number of papers per keyword per year of publication

3. **Evaluate which journal is right for your manuscript**
   - Impact Factor
   - SNIP & SJR (www.journalmetrics.com )
   - *h*-Index
   - Compare journals (Scopus)

4. **Find out more about the journals**
   - Who are the editors?
   - Guide for authors

Scopus

Altmetric


SJR SCImago Journal & Country Rank



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# Refine your search strategies

Too many researchers have abandoned all the value of libraries when they stopped going there physically!

There is more than 


Learn what online resources are available at your institute, and learn to search in a clever way.

*Ask your library experts for help*.

Haglund and Olson, 2008:
*"… researchers have difficulties in identifying correct search terms. Searches are often unsuccessful."*



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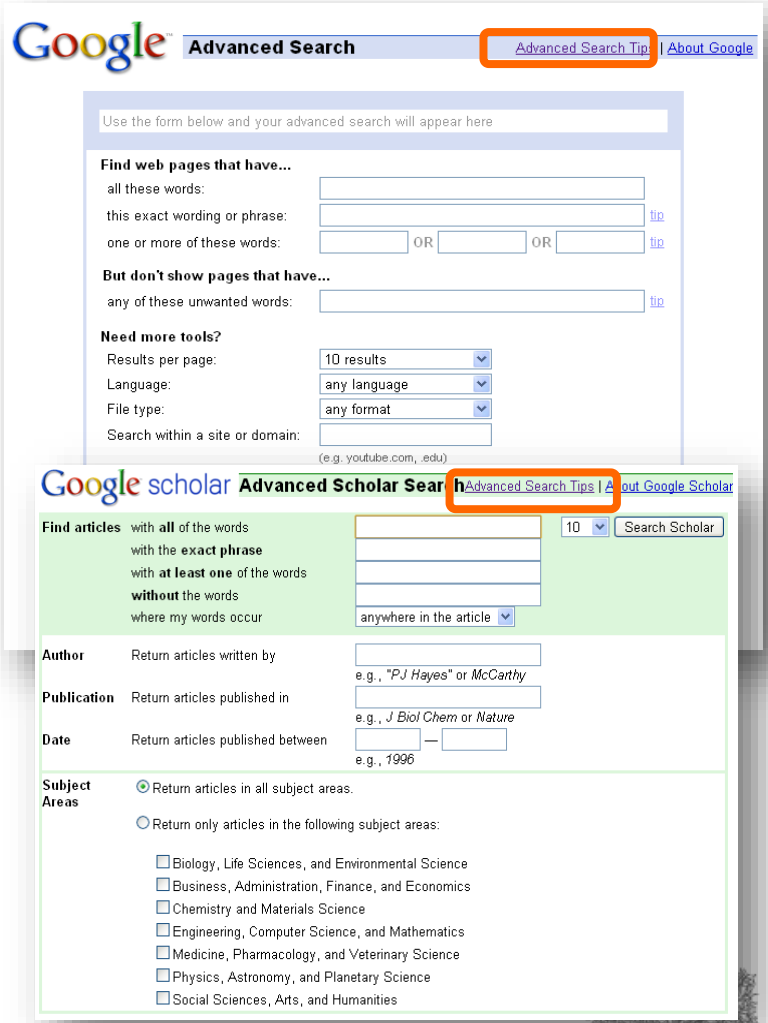
# Use the advanced search options

- **Within Google and Google Scholar use the advanced searches and check out the Search Tips.**

- **In ScienceDirect, Scopus, WoS/WoK and other databases use proximity operators:**
  - w/n ← Within - (non order specific)
  - pre/n ← Precedes - (order specific)

E.g. wind w/3 energy



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# Questions to answer before you write

Think about **WHY you want to publish your work**.

- Is it **new and interesting**?
- Is it a current **hot topic**?
- Have you **provided solutions** to some difficult problems?
- Are you **ready** to publish at this point?

If **all answers are "yes", then start preparations for your manuscript**



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# What type of manuscript?

- **Full article/ Primary Data article**
- **Letter/Rapid Communication/Short Communication**
- **Review paper/ Perspective**

**Self-evaluate your work: Is it sufficient for a full article? Or are your results so thrilling that they need to be shown as soon as possible?**

**Ask your supervisor and colleagues for advice on manuscript type. Sometimes outsiders see things more clearly than you.**

# How To Write and publish Great Papers

*Select your audience*

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# Select the best journal for submission

- Look at **your references** – these will help you narrow your choices.

- **Browse** recent publications in **each "candidate journal"**. Find out their Aims & Scope, the current hot topics, the accepted types of articles, etc.

- Ask yourself the following questions:
  - Is the journal **peer-reviewed** to the right level?
  - How **fast** does it make a decision? How fast does it publish a paper?
  - What is the journal's **Impact Factor**?
  - Is it a reputable journal or is it **dubious**? (check for example Beall's List of Predatory Open Access Publishers)
    http://scholarlyoa.com/2014/01/02/list-of-predatory-publishers-2014/

- **DO NOT gamble by submitting your manuscript to more than one journal at a time**
  - International ethics standards prohibit multiple/simultaneous submissions, and editors DO find out! (Trust us, they DO!)

# What is the Impact Factor (IF)?

**Impact Factor**

*[the average annual number of citations per article published]*

- For example, the 2013 impact factor for a journal is calculated as follows:
  - *A* = the number of times articles published in 2011 and 2012 were cited in indexed journals during 2013
  - *B* = the number of "citable items" (usually articles, reviews, proceedings or notes; not editorials and letters-to-the-Editor) published in 2011 and 2012
  - 2013 impact factor = *A*/*B*
  - **e.g. 600 citations = 2.000**

    **140 + 160 articles**



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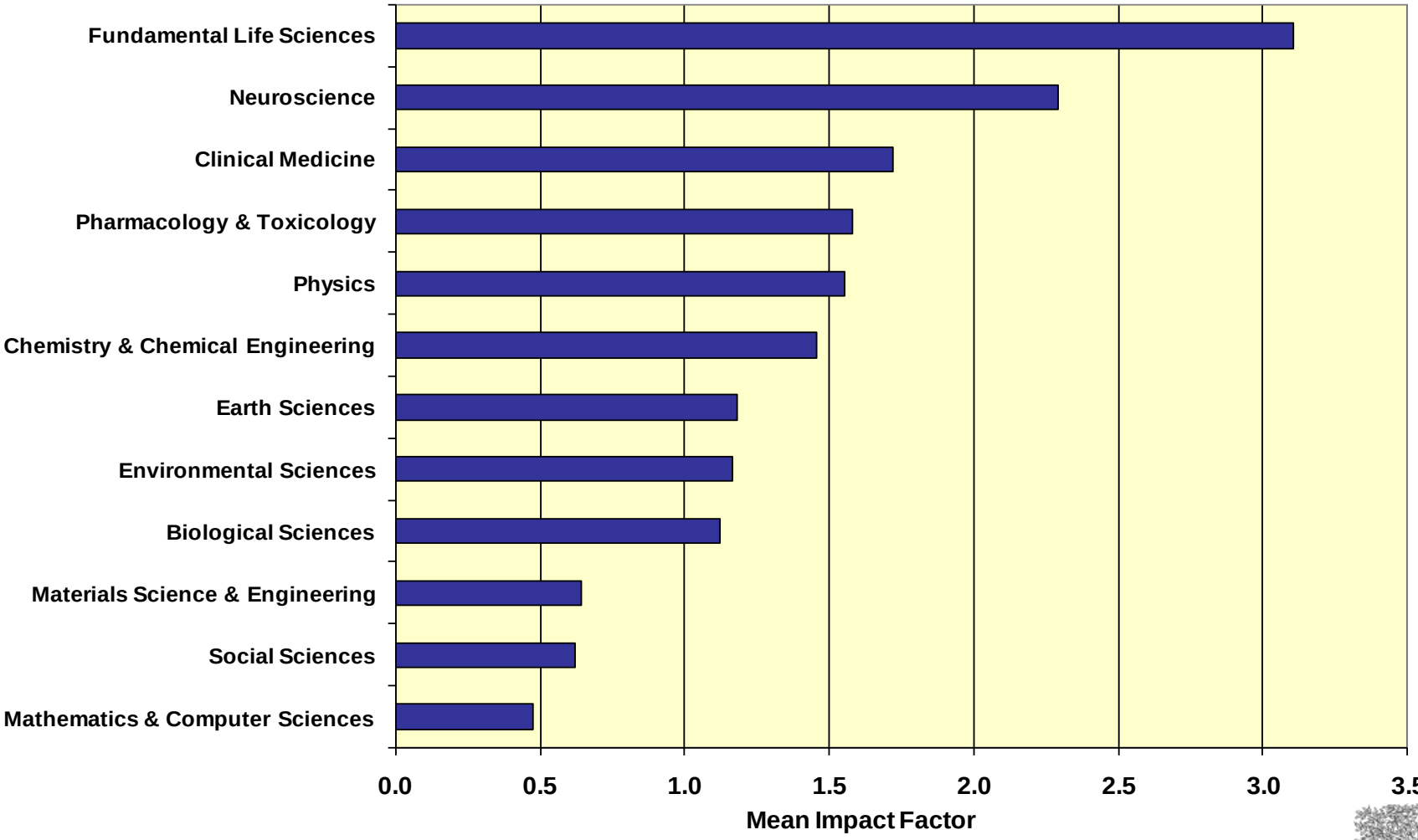
# Influences on Impact Factors: Subject Area



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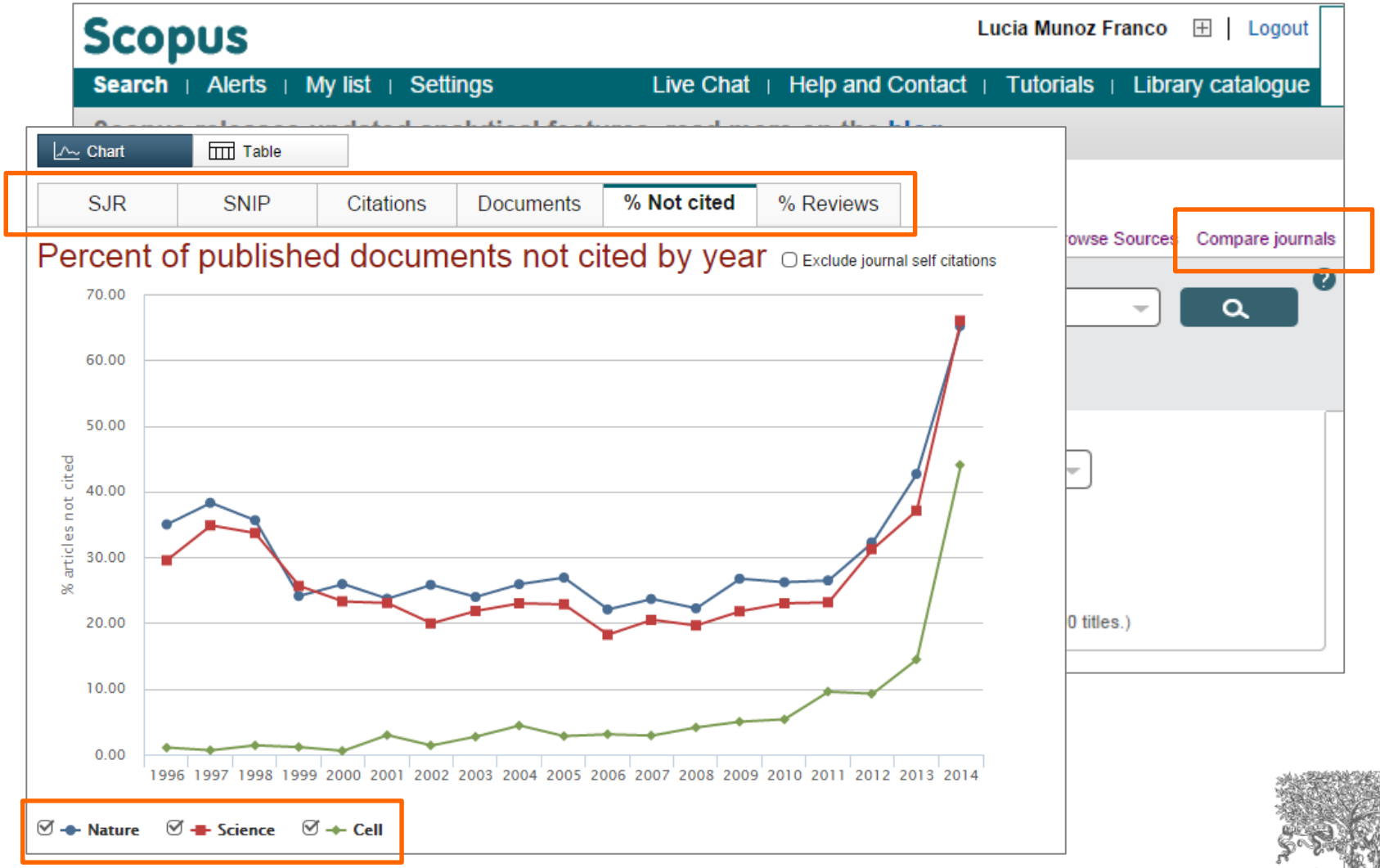
# Compare journals



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# Your Journals list for this manuscript

So you now have a sequence list of candidate journals for your manuscript?

All co-authors agree to this list

Write your draft as if you are going to submit to the first journal on your list. Use its Guide for Authors



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# Read the 'Guide for Authors' – Again and again!

- Stick to the Guide for Authors in your manuscript, even in the first draft (text layout, nomenclature, figures & tables, references, etc.).
  In the end it will save you time, and also the editor's.

- Editors (and reviewers) do not like wasting time on poorly prepared manuscripts. It is a sign of disrespect.




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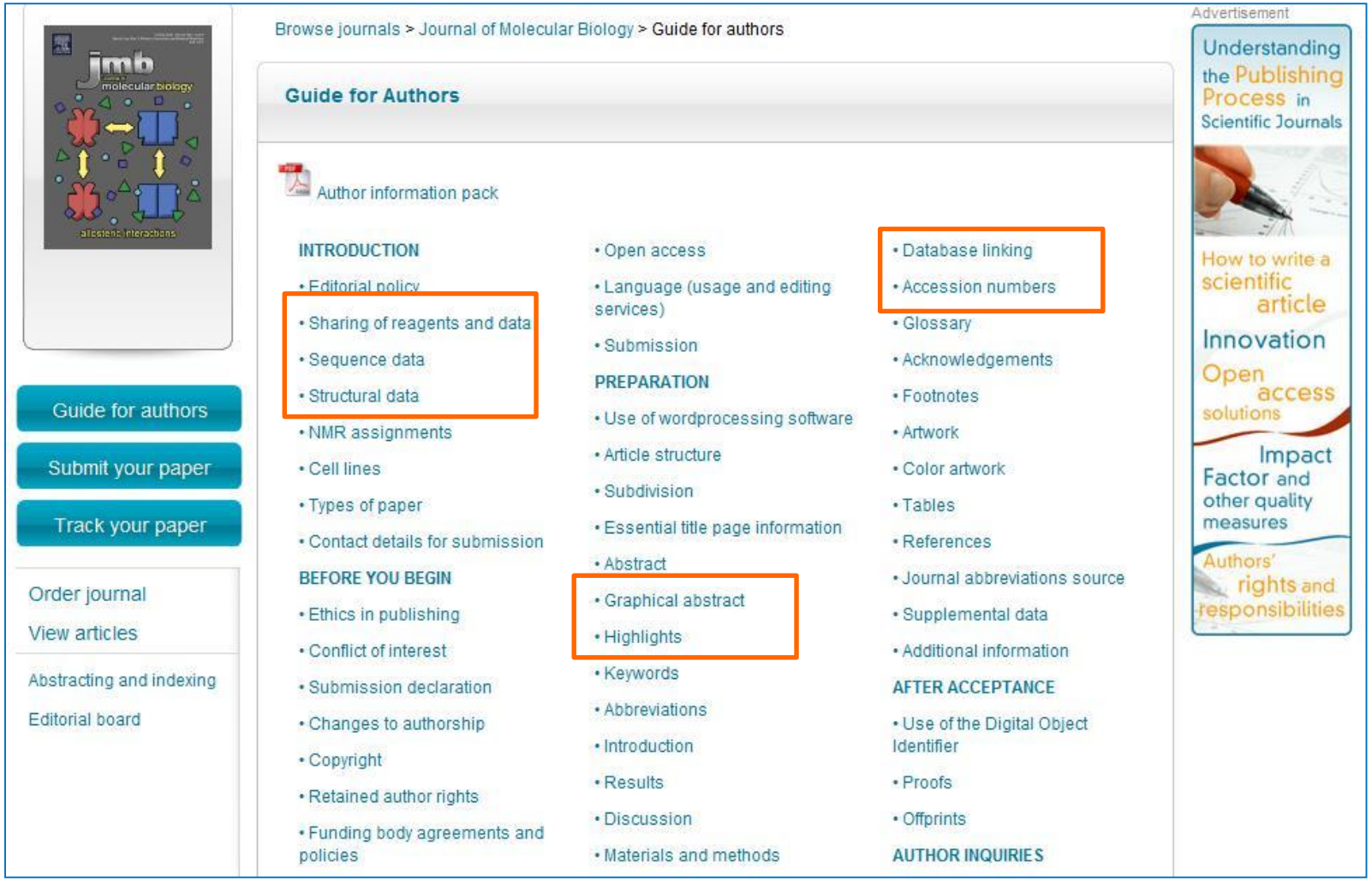
# Read the ‘Guide for Authors’ – Again and again!



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# Common problems with submissions:

## An international editor says…

***"The following problems appear much too frequently"***

- *Submission of papers which are clearly out of scope*
- *Paper is not formatted according to the Guide for Authors*
- *Inappropriate (or no) suggested reviewers*
- *Inadequate response to reviewers*
- *Inadequate standard of English*
- *Resubmission of rejected manuscripts without revision*

– Paul Haddad, Editor, *Journal of Chromatography A*



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# Why Is Language Important?

**Save your editor and reviewers the trouble of guessing what you mean**

**Complaint from an editor:**

***"[This] paper fell well below my threshold. I refuse to spend time trying to understand what the author is trying to say. Besides, I really want to send a message that authors can't submit a substandard paper to us and expect us to fix it. My rule of thumb is that if there are more than 6 grammatical errors in the abstract, then I don't waste my time carefully reading the rest."***



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# Scientific Language – Overview

**Write with clarity, objectivity, accuracy, and brevity.**

- **Key to successful scientific writing is to be alert for common errors:**
  - Sentence construction
  - Incorrect tenses
  - Inaccurate grammar
  - Not using English

# Scientific Language – Sentences

- **Write direct and short sentences – more professional looking**
- **One idea or piece of information per sentence is sufficient**
- **Avoid multiple statements in one sentence – they are confusing to the reader.**

**An example of what NOT to do:**

*"If it is the case, intravenous administration should result in that emulsion has higher intravenous administration retention concentration, but which is not in accordance with the result, and therefore the more rational interpretation should be that SLN with mean diameter of 46nm is greatly different from emulsion with mean diameter of 65 nm in entering tumor, namely, it is probably difficult for emulsion to enter and exit from tumor blood vessel as freely as SLN, which may be caused by the fact that the tumor blood vessel aperture is smaller."*

# How To Write and publish Great Papers

*The article structure*

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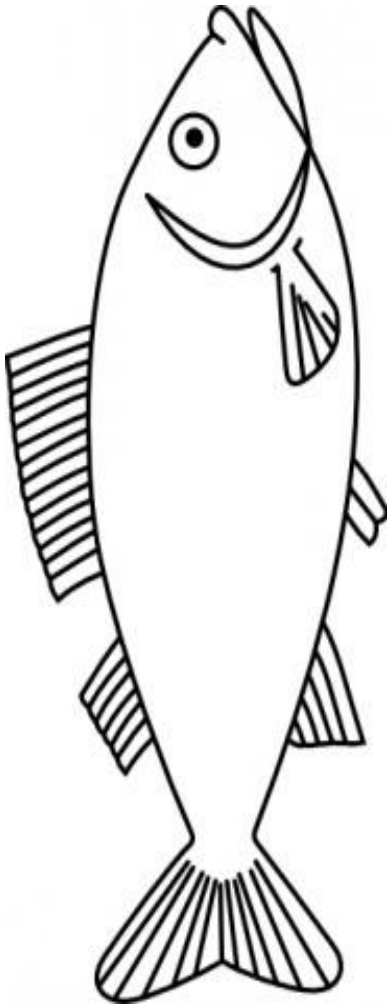
# General Structure of a Research Article



- **Title**
- **Abstract**
- **Keywords**

Make it easy for indexing and searching
(informative, attractive, effective)

- **Main text**
  - Introduction
  - Methods
  - Results
  - Discussion

<u>Your readers' time is scarce</u>

Make your article as concise as possible

(more difficult than you think!)

- **Conclusion**
- **Acknowledgements**
- **References**
- **Supplementary Data**



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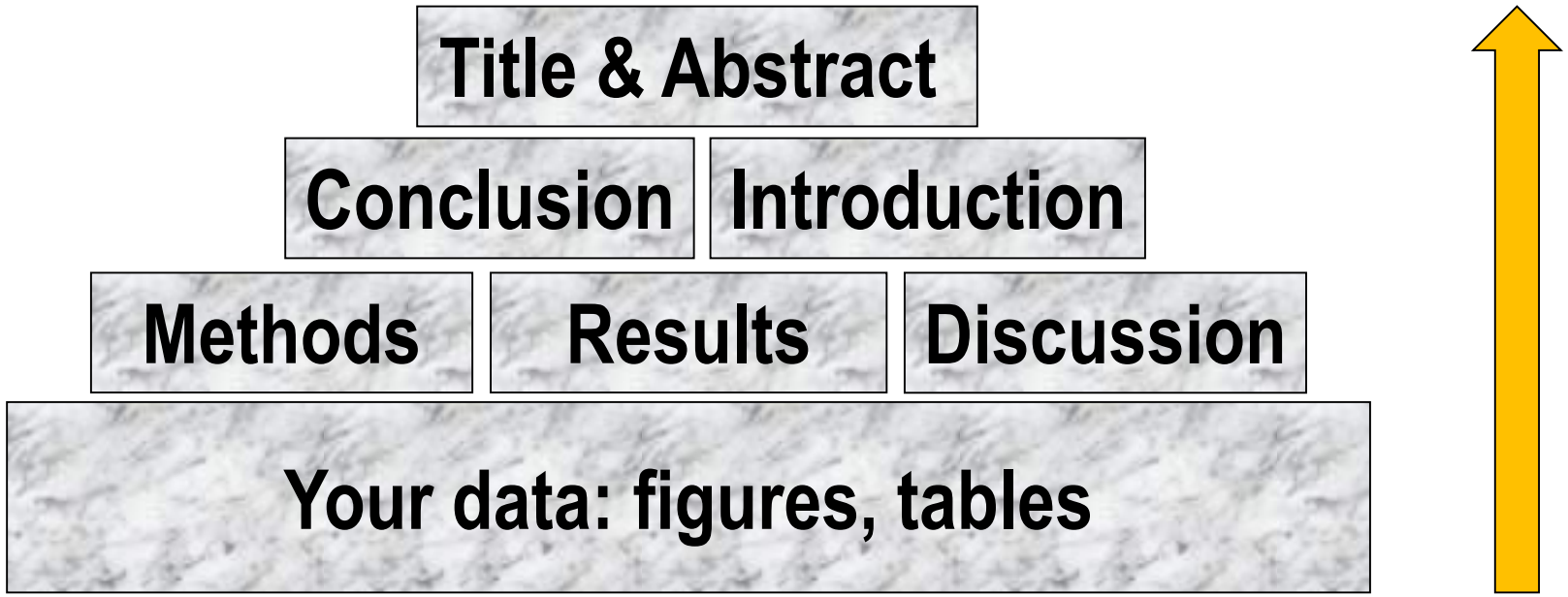
# The process of writing – building the article



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# Title

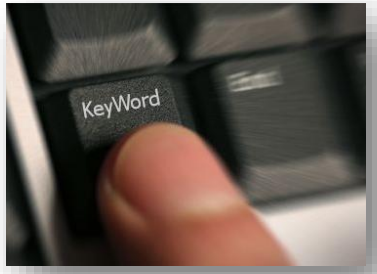
- **A good title should contain the fewest possible words that adequately describe the contents of a paper.**

- **Effective titles**
  - Identify the main issue of the paper
  - Begin with the subject of the paper
  - Are accurate, unambiguous, specific, and complete
  - Are as short as possible
  - Do not contain rarely-used abbreviations
  - Attract readers – Remember: readers are the potential authors who will cite your article

**Articles with short, catchy titles are better cited**

# Keywords

In an electronic world, keywords determine whether your article is found or not!




Avoid making them

- too general (“drug delivery”, “mouse”, “disease”, etc.)
- too narrow (so that nobody will ever search for it)

Effective approach:

- Look at the keywords of articles relevant to your manuscript
- Play with these keywords, and see whether they return relevant papers, neither too many nor too few



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# Abstract

## Tell readers what you did and the important findings

- One paragraph (between 50-250 words) often, plus Highlight bullet points
- Advertisement for your article
- A clear abstract will strongly influence if your work is considered further

*Graphite intercalation compounds (GICs) of composition CxN(SO2CF3)2 · δF are prepared under ambient conditions in 48% hydrofluoric acid, using K2MnF6 as an oxidizing reagent. The stage 2 GIC product structures are determined using powder XRD and modeled by fitting one dimensional electron density profiles.*

**What has been done**

*A new digestion method followed by selective fluoride electrode elemental analyses allows the determination of free fluoride within products. The compositional x and δ parameters are determined for reaction times from 0.25 to 500 h.*

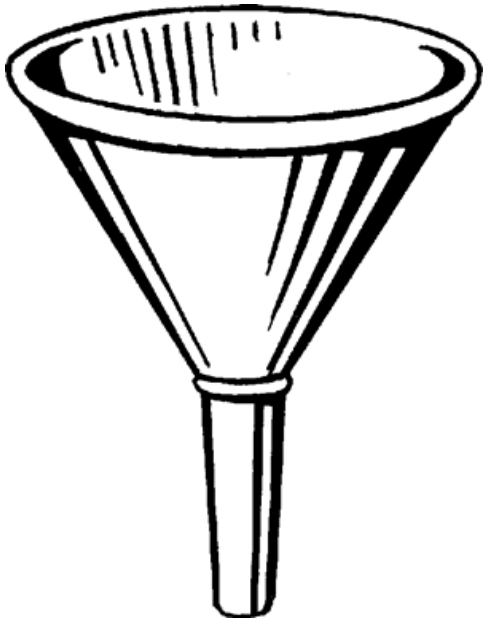
**What are the main findings**

# Introduction

## The place to convince readers that you know why your work is relevant, also for them

**Answer a series of questions:**

- What is the problem?
- Are there any existing solutions?
- Which one is the best?
- What is its main limitation?
- How do you hope to improve or contribute to this?



General

Specific



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# Introduction – puts your data into perspective

**Pay attention to the following:**

- **Be brief, it is not a history lesson**
- **Do not mix introduction, results, discussion and conclusions. Keep them separate**
- **Do not overuse expressions such as “novel”, “first time”, “first ever”, “paradigm shift”, etc.**
- **Cite only relevant references**
  - Otherwise the editor and the reviewer may think you don’t have a clue what you are writing about!

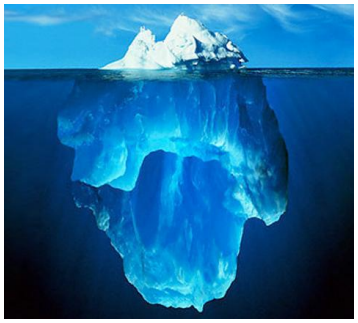
# Methods / Experimental section

- **Include all important details so that the reader can repeat the work.**
  - Details that were previously published can be omitted but a general summary of those experiments should be included
- **Give vendor names (and addresses) of equipment used, etc.**
- **All chemicals must be identified**
  - Do not use proprietary, unidentifiable compounds without description
- **Present proper control experiments**
- **Avoid adding comments and discussion.**
- **Consider use of Supplementary Materials**
  - Documents, spreadsheets, audio, video, .....

**Reviewers pay close attention to experimental sections.**
**They will criticize incomplete or incorrect descriptions**

# Results – what have you found?

- **The following should be included**
  - the **main findings**
    - Thus not *all* findings
    - Findings from experiments described in the Methods section
  - Highlight findings that **differ** from findings in previous publications, and **unexpected** findings
  - Results of the **statistical analysis**





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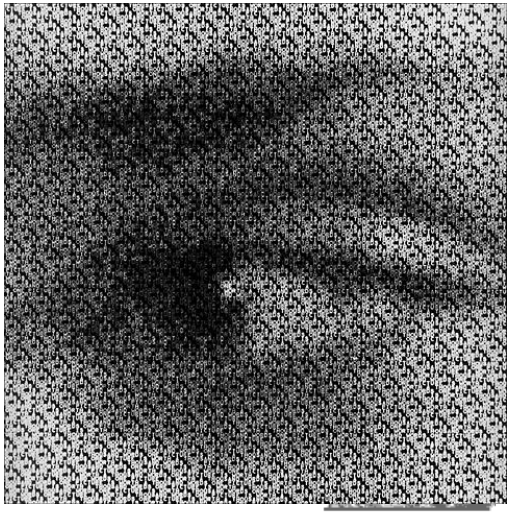
# Results – Figures and tables

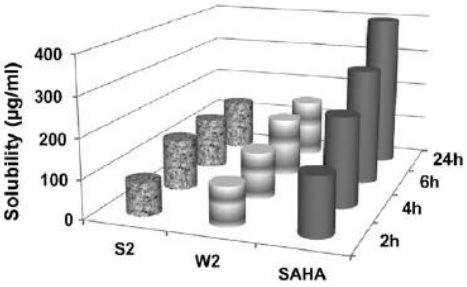
- **Illustrations are critical, because**
  - Figures and tables are the most efficient way to present results
  - Results are the driving force of the publication
  - Captions and legends must be detailed enough to make figures and tables self-explanatory
  - No duplication of results described in text or other illustrations

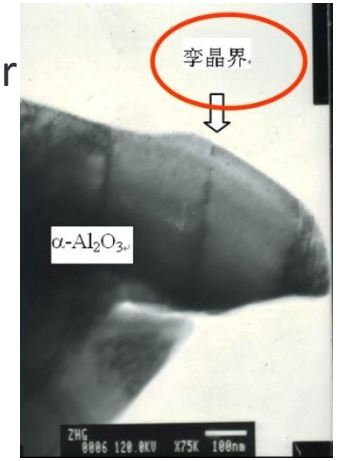
***"One Picture is Worth a Thousand Words"***
***Sue Hanauer (1968)***

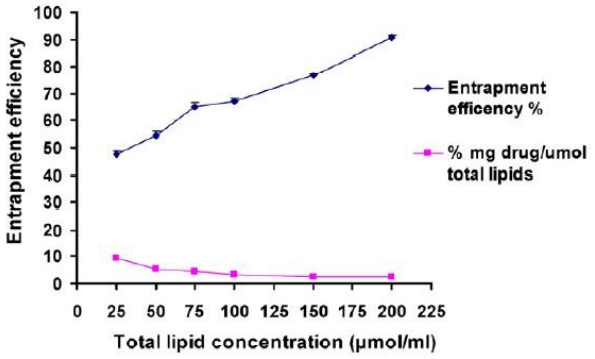


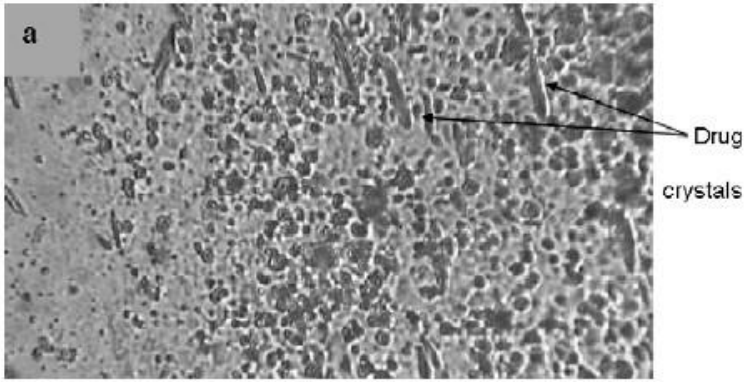
# Figures and tables – Appearance counts!

- Un-crowded plots
  - 3 or 4 data sets per figure; well-selected scales; appropriate axis label size; symbols clear to read; data sets easily distinguishable.
- Text in photos / figures in English
  - Not in French, Spanish, Chinese, Korean, ...
- Each photograph must have a scale marker of professional quality in a corner.
- Use color *ONLY* when necessary.
  - If different line styles can clarify the meaning, then never use colors or other thrilling effects.
- Color must be visible and distinguishable when printed in black & white.
- Do not include long boring tables!



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# Discussion – what do the results mean?

- **It is the most important section of your article. Here you get the chance to SELL your data!**
  - Many manuscripts are rejected because the Discussion is weak

- **Check for the following:**
  - How do your results relate to the original question or objectives outlined in the Introduction section?
  - Do you provide interpretation for each of your results presented?
  - Are your results consistent with what other investigators have reported? Or are there any differences? Why?
  - Are there any limitations?
  - Does the discussion logically lead to your conclusion?

- **Do not:**
  - Make statements that go beyond what the results can support
  - Suddenly introduce new terms or ideas

# Conclusions

- **Present global and specific conclusions**
- **Indicate uses and extensions if appropriate**
- **Suggest future experiments and indicate whether they are underway**
- **Do not summarize the paper**
  - The abstract is for that purpose
- **Avoid judgments about impact**

# References: get them right!

- **Please adhere to the Guide for Authors of the journal**
- **It is your responsibility, not of the Editor's, to format references correctly!**
- **Check**
  - Referencing style of the journal
  - The spelling of author names, the year of publication
  - Punctuation use
- **Avoid citing the following if possible:**
  - Personal communications, unpublished observations, manuscripts not yet accepted for publication
    - Editors may ask for such documents for evaluation of the manuscripts
  - Articles published only in the local language, which are difficult for international readers to find



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# Supplementary Material

- **Data of secondary importance for the main scientific thrust of the article**
  - e.g. individual curves, when a representative curve or a mean curve is given in the article itself
- **Or data that do not fit into the main body of the article**
  - e.g. audio, video, ....
- **Not part of the printed article**
  - Will be available online with the published paper
- **Must relate to, and support, the article**

# Cover Le

## Your c

- Submitt
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- Note sp

Professor H. D. Schmidt
School of Science and Engineering
Northeast State University
College Park, MI 10000
USA

January 1, 2008

Dear Professor Schmidt,

Enclosed with this letter you will find en electronic submission of a manu
entitled "Mechano-sorptive creep under compressive loading – a microm
model" by John Smith and myself. This is an original paper which
previously nor simultaneously in whole or in part been submitted
Both authors have read and approved the final version submitted.

Mechano-sorptive is sometimes denoted as accelerated creep. It has been experimentally observed that the creep of paper accelerates if it is subjected to a cyclic moisture content. This is of large practical importance for the paper industry. The present manuscript describes a micromechanical model on the fibre networ level that is able to capture the experimentally observed behaviour. In particular, th difference between mechano-sorptive creep in tension and compression is analyse John Smith is a PhD-student who within a year will present his doctoral thesis. T present paper will be a part of that thesis.

Three potential independent reviewers who have excellent expertise in the this paper are:

Dr. Fernandez, Tennessee Tech, email1@university.com
Dr. Chen, University of Maine, email2@university.com
Dr. Singh, Colorado School of Mines, email3@university.com

I would very much appreciate if you would consider the manuscript for publication in the *International Journal of Science*.

ely yours,

A. Professor

**Final approval from all authors**

**Explanation of importance of research**

**Suggested reviewers**



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# Suggest potential reviewers

- Your suggestions will help the Editor to move your manuscript to the review stage more efficiently.
- You can easily find potential reviewers and their contact details from articles in your specific subject area (e.g., your references).
- The reviewers should represent at least two regions of the world. And they **should not** be your supervisor or close friends.
- Be prepared to suggest 3-6 potential reviewers, based on the Guide to Authors.



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# Do everything to make your submission a success

- **No one gets it right the first time!**
  - Write, and re-write ….
- **Some suggestions**
  - After writing a first version, take several days of rest. Come back with a critical, fresh view.
  - Ask colleagues and supervisor to review your manuscript. Ask them to be highly critical, and ***be open to their suggestions***.
  - Make changes to incorporate comments and suggestions. Get all co-authors to approve the version to be submitted.

**Then it is time to submit your article!**



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# How To Write and publish Great Papers

*The review and editorial process*

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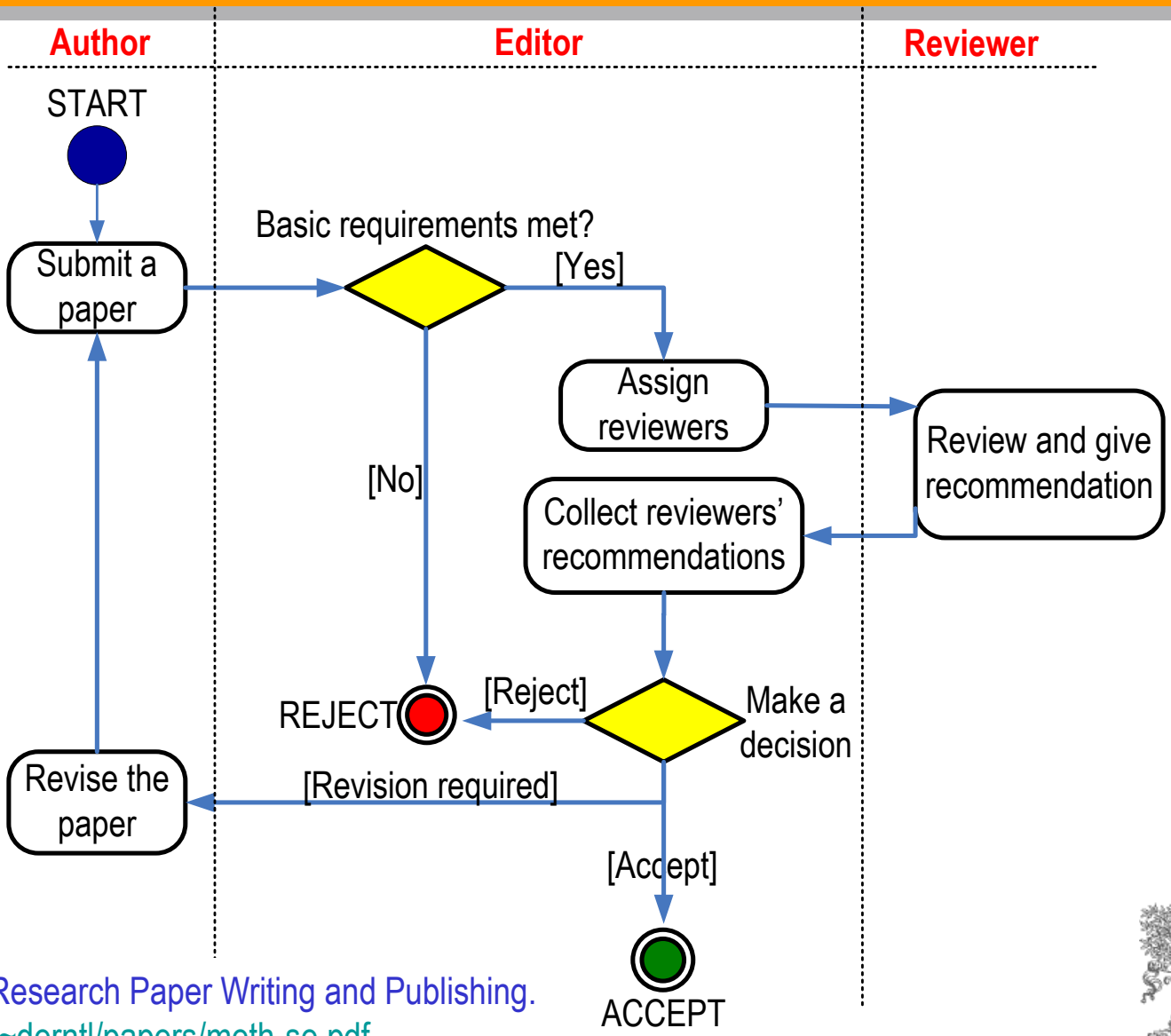
# The Peer Review Process – not a black hole!




Michael Derntl. Basics of Research Paper Writing and Publishing.
http://www.pri.univie.ac.at/~derntl/papers/meth-se.pdf

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# Initial Editorial Review or Desk Reject

**Many journals use a system of initial editorial review. Editors may reject a manuscript without sending it for review**

**Why?**

- It is a disservice to ask reviewers to spend time on work that clearly does not fit that particular journal or that has evident deficiencies.

- The peer-review system is grossly overloaded and editors wish to use reviewers only for those papers with a good probability of acceptance.




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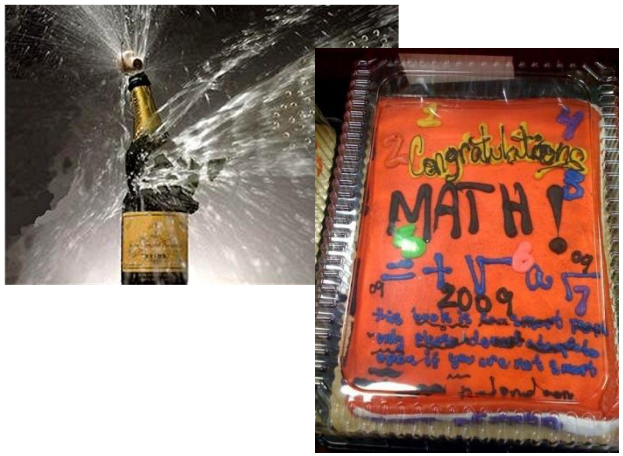
# First Decision: "Accepted" or "Rejected"

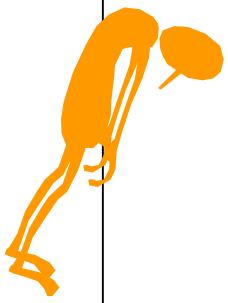
## Accepted

- **Very rare, but it happens**




- **Congratulations!**
  - Cake for the department
  - Now wait for page proofs and then for your article to be online and in print

## Rejected



- **Probability 40-90% …**
- **Do not despair**
  - It happens to everybody
- **Try to understand WHY**
  - Consider reviewers' advice
  - Be self-critical
- **If you submit to another journal**
  - Take advantage of the reviewers' comments (they may review your paper for the other journal too!)
  - Read the Guide for Authors of the new journal, again and again.

# First Decision: “Major” or “Minor” Revision

- **Major revision**
  - The manuscript may finally be published in the journal
  - Significant deficiencies must be corrected before acceptance
  - Usually involves (significant) textual modifications and/or additional experiments

- **Minor revision**
  - Basically, the manuscript is worth being published
  - Some elements in the manuscript must be clarified, restructured, shortened (often) or expanded (rarely)
  - Textual adaptations
  - “Minor revision” does NOT guarantee acceptance after revision, but often it is accepted if all points are addressed!

# Manuscript Revision

- **Prepare a detailed Response Letter**
  - Copy-paste each reviewer comment, and type your response below it
  - State specifically which changes you have made to the manuscript
    - Include page/line numbers
    - No general statements like “Comment accepted, and Discussion changed accordingly.”
  - Provide a *scientific* response to comments ...
  - ... or a convincing and polite rebuttal when you feel the reviewer was wrong.
  - Write in such a manner, that your response can be forwarded to the reviewer without prior editing

**take manuscript revision seriously and avoid the risk of rejection**



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and publish

# How to Write Great papers

*Author responsibilities*

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# Responsibilities

**As authors we have lots of rights and privileges but also we have the responsibility to act ethically.**



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# Ethics Issues in Publishing

## Scientific misconduct

- Falsification of results

## Publication misconduct

- Duplicate submission
- Duplicate publication
- Inappropriate acknowledgement of prior research and researchers
- Inappropriate identification of co-authors
- Plagiarism
  - Different forms/ severities
  - The paper must be original to the authors
- Conflict of interest

# Who is allowed to be an Author?

- **Policies regarding authorship can vary**
- **One example: the International Committee of Medical Journal Editors ("Vancouver Group") declared that an author must:**
  1. **substantially contribute** to conception and design, or acquisition of data, or analysis and interpretation of data;
  2. **draft** the article or **revise** it critically for important intellectual content; and
  3. **give their approval** of the final full version to be published.
  4. **ALL three** conditions must be fulfilled to be an author!

All others would qualify as "Acknowledged Individuals"



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# Authorship – Order & Abuses to avoid

- **General principles for who is listed first:**
  - First Author
    - Conducts and/or supervises the data generation and analysis and the proper presentation and interpretation of the results
    - Puts paper together and submits the paper to journal
  - Corresponding author
    - The first author or a senior author from the institution
      - Particularly when the first author is a PhD student or postdoc, and may move to another institution soon.

- **Abuses to be avoided:**
  - Ghost Authorship: leaving out authors who should be included
  - Gift Authorship: including authors who did not contribute significantly

# Acknowledged Individuals

**Recognize those who helped in the research, but do not qualify as authors (you want them to help you again, don't you?)**

Include individuals who have assisted you in your study:

- Advisors
- Financial supporters
- Proofreaders
- Typists
- Suppliers who may have given materials

# Author names: common problems

- **Different spellings**
  - Mu**ñ**oz Franco / Mu**n**oz Franco/ Muñoz**-**Franco / Muñoz / M. Franco
  - J**ä**rvinen / J**ae**rvinen / J**a**rvinen
  - Lue**ß**en / Lue**b**en / Lue**ss**en
- **First/Last Names**
  - Asian names often difficult for Europeans or Americans
- **What in case of marriage/divorce?**

**Be consistent!**

If you are not, how can others be?

# Data fabrication and falsification

***Fabrication:*** **Making up data or results, and recording or reporting them**

*"… the fabrication of research data … hits at the heart of our responsibility to society, the reputation of our institution, the trust between the public and the biomedical research community, and our personal credibility and that of our mentors, colleagues…"*

*"It can waste the time of others, trying to replicate false data or designing experiments based on false premises, and can lead to therapeutic errors. It can never be tolerated."*

**Professor Richard Hawkes**
**Department of Cell Biology and Anatomy**
**University of Calgary**

***"The most dangerous of all falsehoods is a slightly distorted truth."***
**G.C.Lichtenberg (1742-1799)**



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# Data fabrication and falsification

***Falsification:***

- Manipulation of research materials, equipment, processes
- Changes in or omission of data or results such that the research is not accurately represented in the research record

*"Avoid selecting data to fit a preconceived hypothesis:*

- *We do not include (data from) an experiment because 'it did not work', or*
- *We show 'representative' images that do not reflect the total data set, or*
- *We simply shelve data that do not fit."*

Richard Hawkes

# Figure Manipulation – some things are allowed

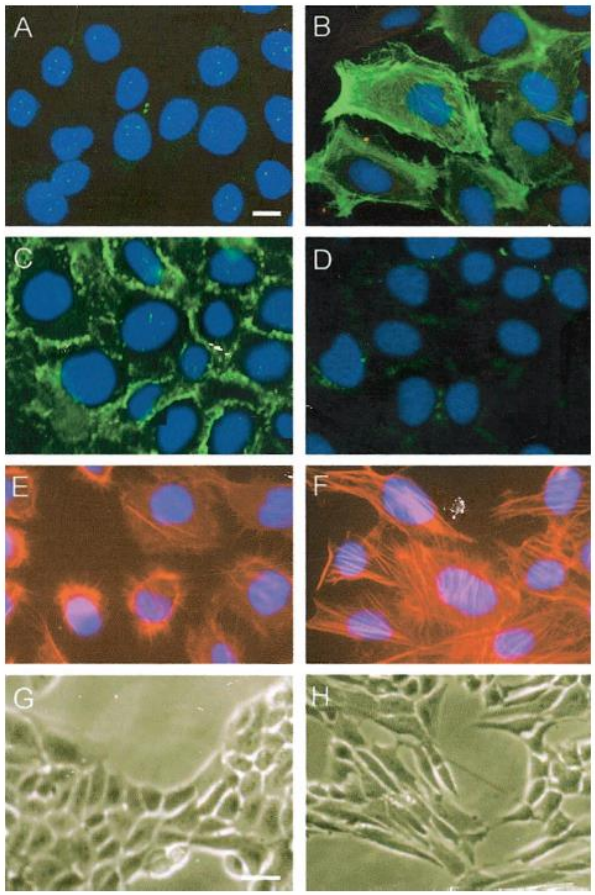
As long as they don't obscure or eliminate info present in the original image


Must be disclosed in the figure legend

# Figure Manipulation

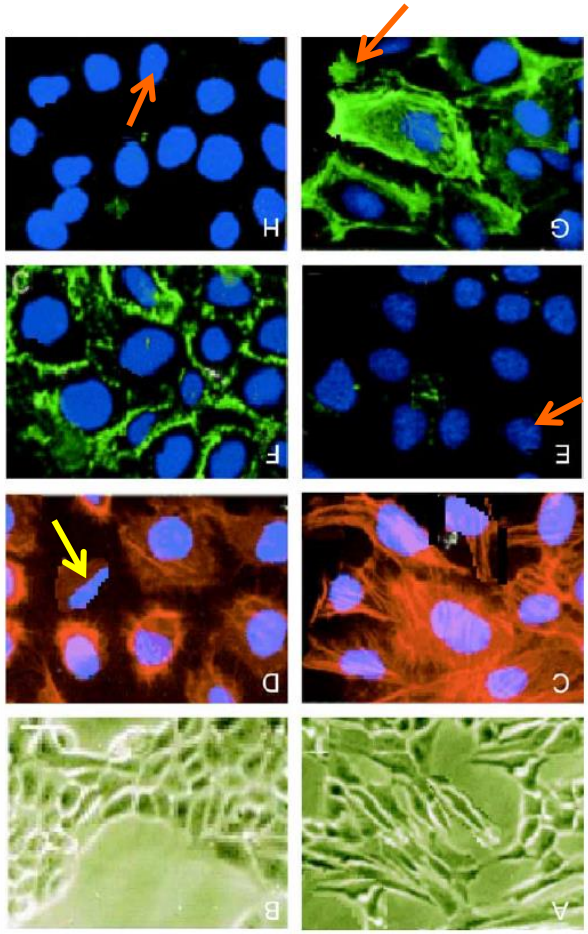
## Example - Different authors and reported experiments

**Am J Pathol, 2001**

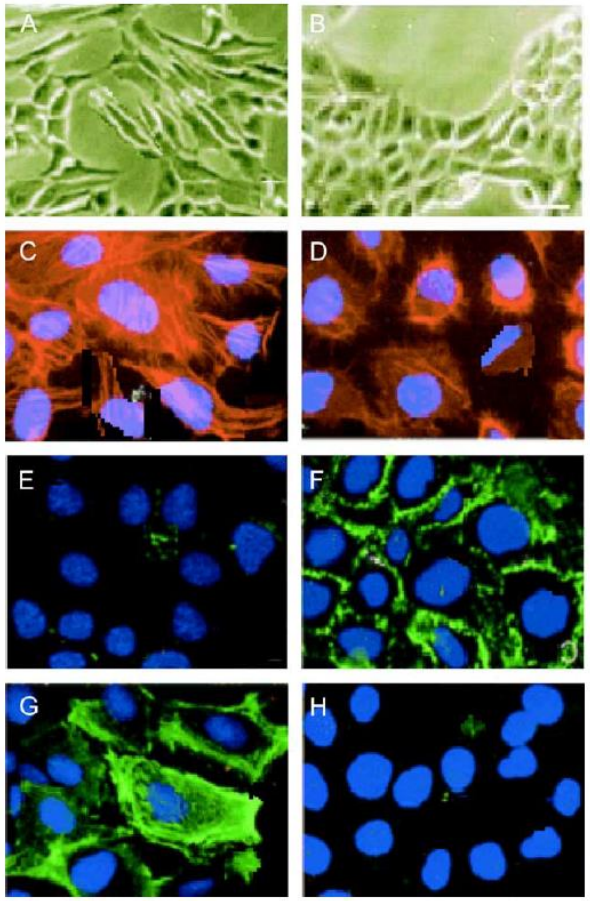



**Worked on, added to, becomes:**

**Rotated 180°**



**Life Sci, 2004**



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# Duplicate Publication

- Duplicate Publication is also called **Redundant Publication**, or **Self Plagiarism**
- **Definition:** Two or more papers, without full cross reference, share the same hypotheses, data, discussion points, or conclusions
- **An author should not submit for consideration in another journal a previously published paper.**
  - Previous publication of an abstract during the proceedings of a conference does not preclude subsequent submission for publication, but full disclosure should be made at the time of submission.
  - Re-publication of a paper in another language is acceptable, provided that there is full and prominent disclosure of its original source at the time of submission.
  - At the time of submission, authors should disclose details of related papers, even if in a different language, and similar papers in press.

**Full disclosure is key to avoid the appearance of duplicate publication**

# Plagiarism

- **A short-cut to long-term consequences!**
- **Plagiarism is considered a *serious offense* by everyone: your institute, journal editors, and the scientific community.**
- **Plagiarism will certainly cause rejection of your paper and may also result in *academic charges*.**
- **Plagiarism will *damage your reputation* in the scientific community.**





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# Plagiarism Detection Tools

**Elsevier participates in a plagiarism detection scheme**

**Manuscripts are checked against a database of 30+ million peer reviewed articles which have been donated by 200+ publishers, including Elsevier.**

**More traditional approach also works quite well**

- **Editors and reviewers**
- **The plagiarized authors**
- **Your colleagues and "other" whistleblowers**




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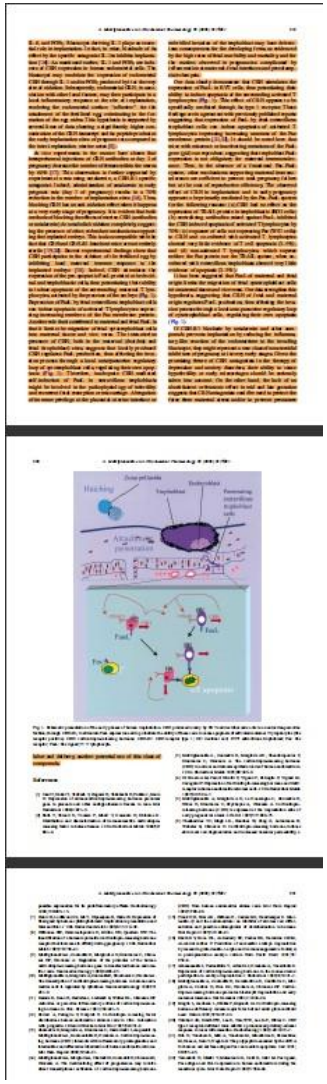
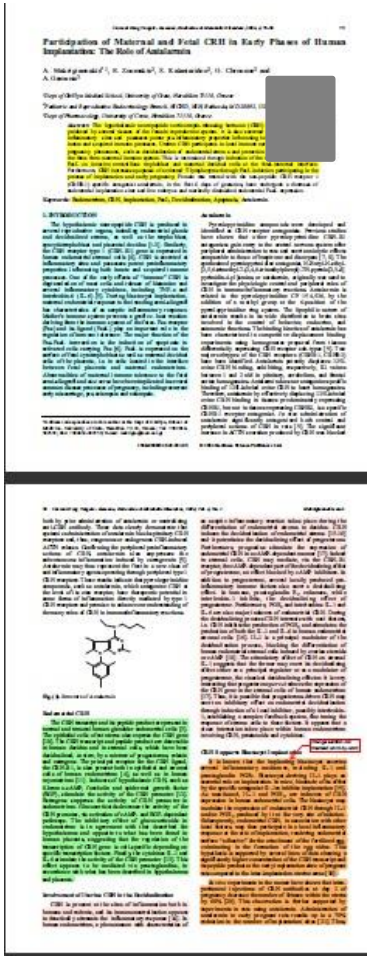
# Publication ethics – Self-plagiarism

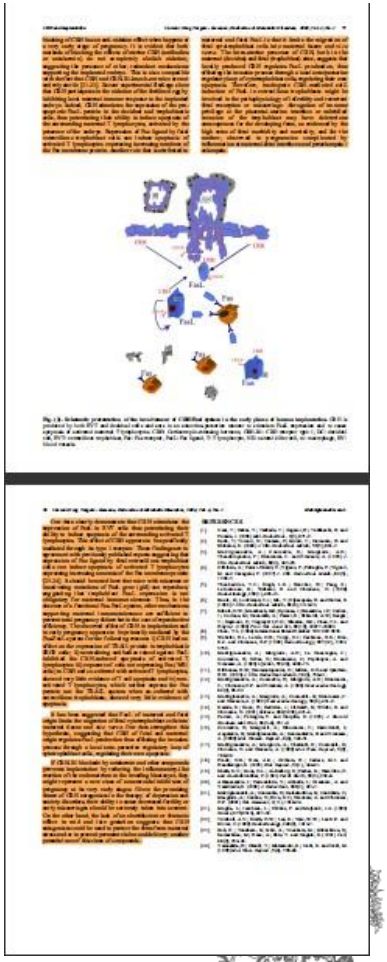
**2003**



**Same colour left and right = Same text**

**2004**







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doi:10.1016/j.sigpro.2005.07.019 Cite or Link Using DOI


# RETRACTED: Matching pursuit-based approach f

N. Ruiz Reyes, P. Vera Candeas, F. J. Cañadas Quesada, J. Carabias Orti

Available online 24 August 2005.

This article has been retracted at the request of the Editor-in-Chief and P

http://www.elsevier.com/locate/withdrawalpolicy.

Reason: This article is virtually identical to the previously published articl

algorithm for SNR improvement in ultrasonic NDT" , *Independent Nonde*

*International,* volume 38 (2005) 453 – 458 authored by N. Ruiz Reyes, P.

RETRACTED

the echoes issuing from the flaws to be detected. Therefore, it cannot be cancelled by classical time averaging or matched band-pass filtering techniques.

Many signal processing techniques have been utilized for signal-to-noise ratio (SNR) improvement in ultrasonic NDT of highly scattering materials. The most popular one is the split spectrum processing (SSP) [1–3], because it makes possible real-time ultrasonic test for industrial applications, providing quite good results. Alternatively to SSP, wavelet transform (WT) based denoising/detection methods have been proposed during recent years [4–8], yielding usually to higher improvements of SNR at the expense of an increase in complexity. Adaptive time-frequency analysis by basis pursuit (BP) [9,10] is a recent technique for decomposing a signal into an optimal superposition of elements in an over-complete waveform dictionary. This technique and some other related techniques have been successfully applied to denoising ultrasonic signals contaminated with grain noise in highly scattering materials [11,12], as an alternative to the WT technique, the computational cost of the BP algorithm being the main drawback.

In this paper, we propose a novel matching pursuit-based signal processing method for improving SNR in ultrasonic NDT of highly scattering materials, such as steel and composites. Matching pursuit is used instead of BP to reduce the complexity. Despite its iterative nature, the method is fast enough to be real-time implemented. The performance of the proposed method has been evaluated using both computer simulation and experimental results, even when the input SNR (SNRin) is lower than 0dB (the level of echoes caused by microstructures is above the level of the echoes).

## 2. Matching pursuit

Matching pursuit was introduced by Mallat and Zhang [13]. Let us suppose an approximation of the ultrasonic backscattered signals $x[n]$ as a linear expansion in terms of functions $g_i[n]$ chosen from an over-complete dictionary. Let H be a Hilbert space. We define the over-complete dictionary as a family $D = \{g_i;\ i = 0, 1, \ldots, L\}$ of vectors in H, such as $\|g_i\| = 1$.

The problem of choosing functions $g_i[n]$ that best approximate the analysed signal $x[n]$ is computationally very complex. Matching pursuit is an iterative algorithm that offers sub-optimal solutions for decomposing signals in terms of expansion functions chosen from a dictionary, where $l^2$ norm is used as the approximation metric because of its mathematical convenience. When a well-designed dictionary is used in matching pursuit, the non-linear nature of the algorithm leads to compact adaptive signal models.

In each step of the iterative procedure, vector $g_i[n]$ which gives the largest inner product with the analysed signal is chosen. The contribution of this vector is then subtracted from the signal and the process is repeated on the residual. At the $m$th iteration the residue is

$$r^m[n] = \begin{cases} x[n], & m = 0, \\ r^{m-1}[n] + a_{g_{i(m)}}[n], & m \neq 0, \end{cases} \quad (1)$$

where $a_{g_{i(m)}}$ is the weight associated to optimum atom $g_{i(m)}[n]$ at the $m$th iteration.

The weight $a_i^m$ associated to each atom $g_i[n] \in D$ at the $m$th iteration is introduced to compute all the inner products with the residual $r^m[n]$:

$$a_i^m = \frac{\langle r^m[n], g_i[n] \rangle}{\langle g_i[n], g_i[n] \rangle} = \frac{\langle r^m[n], g_i[n] \rangle}{\|g_i[n]\|^2} = \langle r^m[n], g_i[n] \rangle. \quad (2)$$

The optimum atom $g_{i(m)}[n]$ (and its weight $a_{g_{i(m)}}$) at the $m$th iteration are obtained as follows:

$$g_{i(m)}[n] = \underset{g_i \in D}{\operatorname{argmin}} \|r^{m+1}[n]\|^2 = \underset{g_i \in D}{\operatorname{argmax}} |a_i^m|^2 = \underset{g_i \in D}{\operatorname{argmax}} |a_i^m|. \quad (3)$$

The computation of correlations $\langle r^m[n], g_i[n] \rangle$ for all vectors $g_i[n]$ at each iteration implies a high computational effort, which can be substantially reduced using an updating procedure derived from Eq. (1). The correlation updating procedure [13] is performed as follows:

$$\langle r^{m+1}[n], g_i[n] \rangle = \langle r^m[n], g_i[n] \rangle - a_{g_{i(m)}} \langle g_{i(m)}[n], g_i[n] \rangle. \quad (4)$$

**An example of an article in which the authors committed plagiarism.**
**It will not be removed from ScienceDirect ever.**
**Everybody who downloads it will see the reason for the retraction…**

Signal Processing
Volume 86, Issue 5, May 2006, Pages 962-970

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# Publication ethics – How it can end …

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## Hungarian president resigns over doctorate plagiarism scandal

Pal Schmitt steps down after university revokes doctorate, saying Olympics thesis was mostly copied from two authors

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Associated Press in Budapest
guardian.co.uk, Monday 2 April 2012 13.29 BST

Article history

The Hungarian president, Pal Schmitt, who has announced his resignation. Photograph: Matej Divizna/EPA

The Hungarian president, Pal Schmitt, has announced he will resign after losing his doctorate in a plagiarism scandal.

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24 February 2011 Last updated at 11:38 GMT

## German minister loses doctorate after plagiarism row

**Germany's defence minister has been stripped of his university doctorate after he was found to have copied large parts of his work from others.**

Mr Guttenberg failed to name sources for parts of his PhD thesis

Karl-Theodor zu Guttenberg, an aristocrat who lives in a Bavarian castle, admitted breaching standards but denied deliberately cheating.

Analysis revealed that more than half of his thesis had long sections lifted word-for-word from the work of others.

So far the German Chancellor, Angela Merkel, has stood by the minister.

The University of Bayreuth decided that Mr Guttenberg had "violated scientific duties to a considerable extent".

It deplored the fact that he had lifted sections of text without attribution.

Last week Mr Guttenberg said he would temporarily give up his PhD title while the university investigated the charges of plagiarism. He admitted that he had made "serious mistakes".

His thesis - Constitution and Constitutional Treaty: Constitutional Developments in the US and EU - was completed in 2006 and published in 2009.

Chancellor Merkel insisted on Monday that she was standing by her defence minister, who was seen as something of a rising star in her conservative coalition

**Related Stories**

Germany's Baron without a title

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# Further reading for you


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# Questions?

**For questions later, please contact l.franco@elsevier.com**



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